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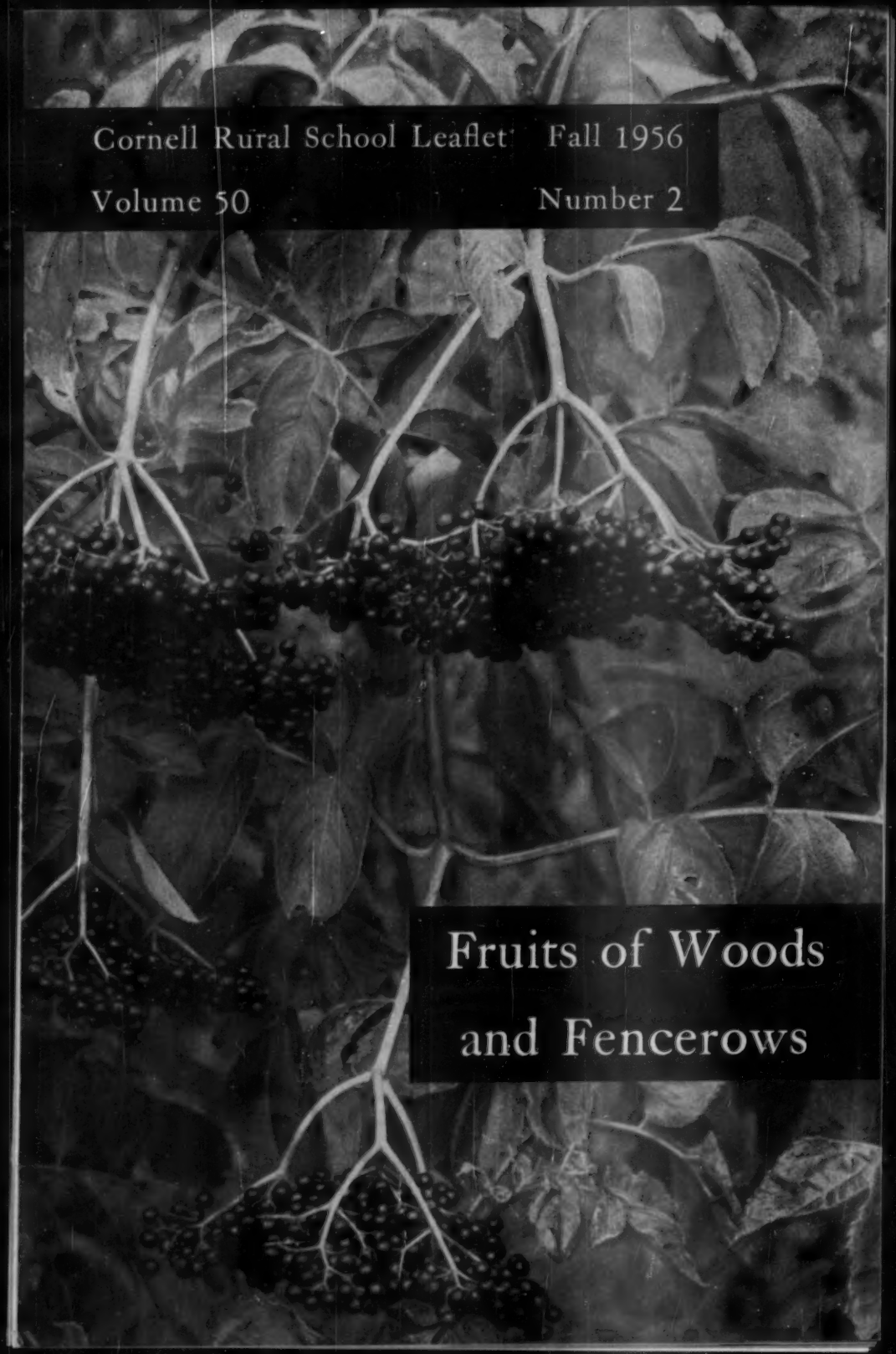

Fruits of Woods and Fencerows

CORNELL RURAL SCHOOL LEAFLET

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Fruits of Woods and Fencerows

EVA L. GORDON AND JOHN I. GREEN

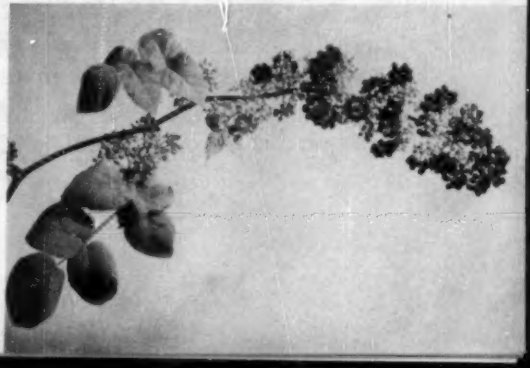
BRIGHT red apples hanging from orchard trees in the warm fall sunshine are a familiar sight to most of you. In New York State fall is harvest time for other well-known fruits: peaches, pears, plums, and grapes. More fruits of many shapes, sizes, and kinds ripen in the autumn, too, in gardens, along roadsides, in old fields and vacant lots, in swamps and other wet places, in woods and fencerows—in short, wherever flowering plants grow and blossom and "go to seed."

In a woods in the fall you may find the scarlet fruits of Jack-in-the-pulpit, tasty red wintergreen berries, and other berrylike fruits. Along woodland borders and paths, you may gather on your clothes the tiny, burry fruits of enchanter's nightshade, sections of tick trefoil pods, and the barbed fruits of sweet cicely. Hickory nuts (fruits) may lead both you and the squirrels to woods and fencerows.

As you walk along a fencerow in the fall, you may see tiny, fuzzy-winged goldenrod fruits float away from what were bright yellow flower clusters a few weeks ago. You may have to stop to shake out of your shoes small grass fruits that you and most other persons call grass "seeds." You may spy dark red or purple choke cherries and find that some of them have a pleasant flavor and others are puckery. You may break open a milkweed fruit—you probably call it a *milkweed pod*—to see how neatly the brown seeds, each with its fine silky "parachute," are packed inside. Without knowing, you may pick up on your clothes the small hooked sticktights (fruits) of avens or *Geum*.

All of these and many more fruits you may discover in woods and fencerows. If you investigate different kinds of places, you will find still others.

American spikenard bears great clusters of dark purple fruits

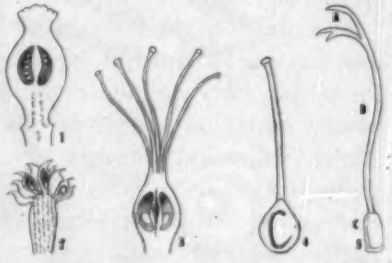


The white oak flowers marked "S" produce pollen; those marked "P" may become acorns, ripe the following fall. Black oak acorns ripen in their second year.

What Is a Fruit?

Have any of you begun to wonder, "Just what *is* a fruit?" Like many other words, *fruit* has several meanings. (How many does your dictionary list? What definitions do your science books give?) When a word, such as *fruit*, is used in science studies, it usually has a special science meaning. To botanists (plant scientists), *a fruit is the seed-bearing part of a plant that has flowers.* Said in another way, a fruit is the part of a flowering plant that contains the seeds. Fruits may be large or small; dry and hard or soft and juicy; of various shapes and colors. But usually each contains one or more seeds. Each kind of plant has its own special form of fruit and seed.

How many kinds of fruits can you list now? Here are a few to start with: a squash; a cucumber; a tomato; a watermelon; a hickory nut; a kernel of corn; an olive; a pod of peas; a poppy pod; a maple "key." Each of these is "the part of a plant that contains the seeds." (Sometimes there is only one seed in a fruit.) All of these fruits (and their seeds) developed from flowers. Even the acorns which are dropping this fall began as spring flowers on oak trees. Can you describe the flowers from which some of the fruits you listed come?



Pistils of: May-apple or mandrake (1), buttercup (2), apple (3), cherry (4), and gladiolus (5). A buttercup has many pistils, each of which may become a one-seeded fruit. The gladiolus pistil is labelled to show the stigma (A), the style (B), and the ovary (C).
Can you find the same three parts in each other pistil?

By fall the yellow flowers of common or European barberry are replaced by scarlet fruits that usually persist through the winter

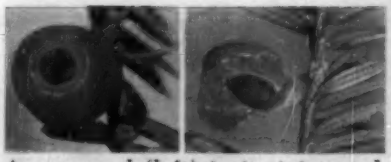
Fruits from flowers

A fruit develops only where a flower has grown—but not from *every* flower that grows. To produce a fruit (and seeds) a flower must have at least one *pistil*. The pistils of several kinds of flowers are shown on page 4. A pistil usually has the three parts labelled in the drawing of the gladiolus pistil (page 4): (1) a *stigma*, (2) a *style*, and (3) an *ovary*. Inside the ovary are one or more *ovules*, which are the future seeds. If you have studied flowers and how seeds are produced, you know that in most flowers pollen (from the stamens of the same flower or another flower of the same kind) must reach the stigma and send down a pollen tube to an ovule in the ovary before that ovule can begin to grow into a seed. Your science books and some of the books listed on pages 31 and 32 tell more about this.

As the seeds grow, the ovary or the ovary and other nearby parts of the flower—even the tip of the flower-stalk—become the fruit. The fruit and the seed or seeds inside it grow and ripen together. Flowers with one pistil produce only one fruit. Those with several pistils usually produce several fruits.

About Pines and Their Relatives

As you probably know, pine cones contain seeds. Spruces, firs, cedars, yews, and other relatives of the pines all produce seeds, too. But none of these plants have flowers and their seeds do not develop inside a pistil. Most of them develop on the scales of woody cones, usually two winged seeds on each scale. An exception to this rule is shown on page 6.



A yew seed (left) in its juicy, red, cuplike covering; at right, cut to show the whole seed

Some Things to Do

Look outdoors for the seed-containing parts of plants. A treasure hunt is fun. Divide your class into groups and see which can collect the greatest number of different kinds of fruits. Fruits that you may find in woods and along fencerows in the fall are the particular subject of this Leaflet. But we think it will help you to learn about fruits you may discover in other kinds of places, and all through the year.

Warning: Avoid *poison ivy*. It may climb high, or creep, or grow erect and bushy. Its brilliantly colored leaves (in autumn) or its dull-white, berry-like fruits (August through the winter) may catch your eye. The plant is dangerous to touch at any time. Poison sumac also has bright autumn foliage and white fruits that stay on through the winter, but you are not likely to meet it except in wooded swamps.

You can find some fruits down at your feet. Others grow high above your head. Put each kind you find in an envelope, a paper or plastic bag, or in some other container. Keep a record of where you found it so that you can arrange your collections in groups such as: (1) fruits from trees; (2) fruits from tall shrubs or bushes; (3) fruits from vines; (4) fruits from low plants (less than knee-high, for example); (5) fruits from plants between knee-height and as high as your head. It is not necessary to give the names of your fruits, but you may wish to label those you are sure you know.

Look for seeds in fruits you find. Most fruits will have at least one seed unless you looked too late. Some of them open when they are ripe and shed their seeds. Have you ever found a seedless fruit? You may, especially among cultivated fruits where man has changed the natural way of growth, as with seedless grapes or oranges.

Look for flowers that are in bloom. You may find their fruits later on. Remember to look at house plants that blossom. Watch the changes that go on as a fruit develops from a flower.

A hemlock cone-scale with its two winged seeds

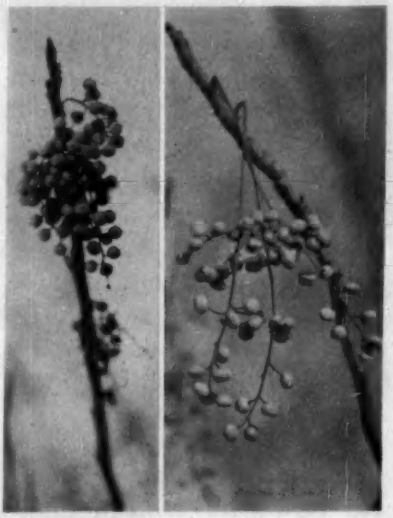
Fruits Have Many Uses

It is easy to think of many ways in which the fruits of flowering plants are useful to man. Think of all the foods you would lack without fruits—orange juice and cereal for breakfast, strawberry ice cream, bread and other foods made from wheat flour, salted peanuts, apples to munch, and many others. Food is only one of the many uses man makes of the fruits and seeds of flowering plants, as you will see on pages 25, 26, and 27. Many kinds of animals other than man use fruits and seeds in various ways, too.

But what about the plants themselves? Certainly they do not produce fruits and seeds just for man and other animals to use. Of what value are they to the plants? You have only to look around you to see young plants, old plants, and perhaps some dead plants. You know that new plants soon fill the places of the older ones that die or are used by man and other animals. Year after year, new plants grow in yards and gardens, fields and fencerows, and in many other places. Seeds are one important way to produce these new plants.

All the large plants that grow around your home are seed-bearing plants. Many of the smaller ones are, too. Some belong to the group that includes the pines, spruces, firs, and their relatives. Many more kinds are flowering plants that have seeds in fruits. All over the world the known kinds of plants that bear flowers and produce fruits containing seeds outnumber the known kinds that do not.

Scientists believe that bearing seeds in fruits is one of the reasons this is true. For one thing,



Poison ivy (left) and poison sumac (right) bear clusters of whitish fruits. To people both plants are nuisances, but some birds eat the fruits

the seeds are protected, first as ovules inside an ovary, then as growing seeds inside a fruit. The fruit and seeds when ripe seem to form a "team," or perhaps a "partnership," that helps to spread the seeds to places where they can grow into new plants. You have probably seen this partnership at work many times. Perhaps pages 20 to 24 will suggest new things to watch for.

Plants from seeds

Many New York State plants die in the fall after the first hard frost. Most of these are *annuals*, plants that grow from seed in the spring or summer, blossom, and produce their own seeds, all in one growing season. These annuals depend entirely on seeds to keep their kind of plant on earth year after year. Only the seeds live through our winters, dormant (inactive), but able to grow when conditions are favorable. The seeds of most kinds of plants have a dormant period. They will not begin to grow as soon as they are ripe.

Plants that live more than one year produce fruits and seeds, too. New plants of many kinds—most trees, for example—usually grow from seeds. But new plants of many kinds can be grown from seeds or in other ways.

Other new plants

You know that planting seeds is not the only way to produce new plants. Perhaps you have helped to plant daffodil or tulip bulbs, and have enjoyed their bright blossoms when the plants came up in the spring. Haven't you seen your mother or your teacher, or someone else, cut a "slip" from a geranium or some other plant and place it in water or in damp sand to root and make a new plant? Willow branches root easily if placed in wet soil, and are sometimes planted in this way along stream banks to control soil erosion. Sometimes young trees (beech trees, for example) sprout from roots of older trees. Some of you may have found a tree stump surrounded by young shoots that had grown up from its roots. Strawberries produce runners which form new plants. How many more ways can you name to produce new plants without planting seeds? How about potatoes?

Of course, all the plants mentioned in the paragraph you have just read can be grown from seeds, too. Perhaps you would like to discuss whether new plants could be produced in any of these other ways if some time plants like them had not grown from seeds.

What Fruits Have You Found?

If your whole class has gathered fruits, probably you have a big collection to study. As you look at each other's specimens, and compare the things you have found, you will almost certainly discover that the study of fruits and seeds is full of puzzles. You may not agree with your neighbor as to which specimens really are fruits. You may wonder whether some of them are not just seeds—especially some of the small dry things. You may have some that really *are* seeds—seeds that are no longer in the fruits in which they grew. It is not always possible to be sure about such things, just by looking. Perhaps this Leaflet will answer some of your questions about some of the fruits and seeds you found. But the fruits we shall talk about are just "samples" of the many kinds that grow in woods and fencerows. You will have many others to wonder about. You will need to be satisfied to say often, "I don't know," or "It looks as if . . .," or "Perhaps this is true," or "Let's try to find out about this." But you will surely discover more kinds of fruits and seeds than you knew existed, and see interesting things that you may not have seen before—things it will be fun to look for year after year.

You will not know the names of all your fruits, but you can learn much about them just by looking, feeling, and sometimes smelling and tasting (when you are sure tasting is safe). You may be able to help each other with some names, and to learn others from the pictures in this Leaflet and from books and pamphlets in your library. It helps to know things by name—if you have correct names. But learning about them is even more important.

European bittersweet or bittersweet nightshade, a vine of woods and fencerows, bears purple or violet flowers from which bright red fruits develop

A good way to begin to study your fruits and seeds is to put together those that seem to be alike in some important way. You can easily see that some of your specimens are soft and pulpy. Some have crisp, juicy flesh, like an apple. Some may have watery pulp. Some may have hard rinds (like a pumpkin) or tough "skins." Some may have thin pulp, no juicier than a dry raisin. When you have sorted out all that are more or less moist and fleshy when they are ripe, you may have a good-sized collection of *fleshy fruits.*

When you have put the fleshy fruits together, you probably will have left *dry fruits* of many sizes, shapes, and forms. You will be sure that some are really fruits because you can see that they contain seeds. Others may puzzle you.

False Solomon's seal (top), a low plant of woodlands, bears its cluster of dull, ruby-red berries at the tip of its arching stem.

The flattened juicy, purple-black fruits of pokeweed or inkberry (center) are poisonous to humans. The plant is tall and coarse.

Red baneberry (bottom), a woodland plant usually less than 3 feet tall, has shiny, cherry-red, mildly poisonous fruits

Fleshy Fruits

If you have a good collection of fleshy fruits, you can group and regroup them to show how they are alike and how they differ. Here are a few suggestions. You can probably think of other ways to arrange your specimens.

Colors differ

You know that most apples change from green to some other color as they ripen. A few kinds are green when they are ripe, but yellow or red are more common colors. Each kind of apple has its own color when it is ripe.

Other fruits, too, have definite colors when they are ripe. Can you find, among your fleshy fruits, some that belong in each of the following groups: (1) red or reddish purple; (2) black or dark purple; (3) blue or blue-black; (4) yellow or orange; (5) green; (6) white. Which colors are most common? Did you find other colors than those listed?

Most fruits are green when they are young. But a ripening blackberry, for example, changes from green to red, and then to purple-black. You might say that a red blackberry is green, meaning that it is still unripe. (*Green* is another of those words with more than one meaning, isn't it?) Have you fruits in your collection that make similar color changes as they develop? The European nightshade, illustrated on page 9, is a good example. Its fruits change from green to yellow to orange to bright red. Often you can find fruits of all these colors on a single vine, and blossoms and young, unopened flower buds as well.

Other differences

Size. Many wild fleshy fruits are small enough to be swallowed whole by even small birds. How big is the largest fruit you found? the smallest?

Shape. Did you find more round fruits than oval ones? Were some so flattened that they did not roll easily? What other shapes did you discover?

Ball-like clusters of black fruit adorn bristly greenbrier or catbrier. Its climbing stem is usually somewhat prickly

Outside surfaces. How many of your fleshy fruits have smooth skins? fuzzy or hairy skins? thin, tender skins? tough skins? skins that you might describe in other ways?

Inside differences

Cut open a specimen or two of each of your fleshy fruits. The pulpy part differs in different kinds, doesn't it? Do any have cores like apples?

Look for the seeds in each kind. You are sure to find many sizes, shapes, and colors. And you are sure to meet puzzles—probably some of the parts you call *seeds* are true seeds (developed from ovules, you remember) and others are not. Wild grapes, for example, have true seeds embedded in their soft pulp. The cores of apples contain true seeds. But elderberries and the good-to-eat wild raisins or nannyberries (page 13) have hard pits with true seeds inside. You will understand this better if you think of a peach or a plum or a cherry. All three are what we call *stone fruits*. Part of the fruit is pulpy and part becomes a hard stone that encloses the seed. Haven't you seen a peach with a split stone and noticed the large seed inside?

Many of the fleshy fruits you find in fields and fencerows in the fall are stone fruits. Many are small. Some—black elderberries, for example—have more than one stone. Usually each stone holds one seed, but stones of some fruits may have more.

You need not try to decide which of the "seeds" you find are true seeds and which are seedlike parts that *contain* seeds. But you may show that you know about this puzzle by making an exhibit (keep it to use again later) and perhaps labelling it *Seeds and Seedlike Parts of Fleshy Fruits*. You *may* call them all *seeds*. But, if you do, remember that you are using not the botanical definition of *seed* (ripened ovule), but another meaning of the word. Sometimes we do this in a Leaflet. When we do, we usually print it this way: "seed." Those quotation marks mean that we chose to use a gen-

The purple-black fruits of maple-leaved Viburnum, a shrub of dry woods, remain long on the plant. Its leaves in autumn are pink to purple

eral definition that includes true seeds, seedlike stones, small seedlike fruits such as dandelion fruits, and other plant parts from which new plants can grow—even "seed potatoes." Can you find such a definition in your dictionary? Does your dictionary give the botanical definition of seed, too? You may find *seed* in quotation marks in other books and pamphlets. Can you tell whether it had its true science meaning?

Some questions to answer

How many of your fleshy fruits have only one seed or seedlike part?

How many have more than ten?

Do all fruits of the same kind in your collection contain the same number of "seeds"?

Woodbine or virginia creeper (top) usually holds its blue-black fruits long after they ripen

Nannyberry or wild raisin (second from top) has blue-black stone fruits with sweet edible pulp

The orange-yellow fruits of American bittersweet (third from top) finally open and show the seeds with their pulpy reddish covering

White-fruited gray dogwood (bottom), a shrub of fencerows and thickets, furnishes wildlife food

Dry Fruits

Haven't you collected many more kinds of dry fruits than of fleshy fruits? What a variety you may have! Big pods of honey locust, perhaps a foot or more in length, each with 10 to 15 seeds inside; round poppy fruits from a garden, from which you may still be able to shake tiny, brown or black seeds; whole heads of sunflower "seeds" (really sunflower fruits, each of which should have one seed inside); grass "seeds;" acorns; sticktights of several kinds; and many others of various sizes and shapes.

Botanists divide these dry fruits into two big groups: (1) those that split in definite ways when they are ripe and shed the seeds they contain; and (2) those that do not open when they ripen and in which the seed and the fruit do not separate. Fruits of the second group usually contain only one or two seeds. Those of the first group almost always have more than one seed, and often they are many-seeded. You would need to know much about fruits and the flowers from which they grow to be able to divide your whole collection correctly into these two groups. But after you have read pages 14 to 19 you probably can pick out some examples of each.

Dry fruits that open

The well-known milkweed pod illustrates one way in which dry fruits open. The pods remain tightly closed until they and the seeds inside are full-grown. But even before they ripen you can see the straight "seam" all the length of the pod, where the split will take place. Later, in warm,

Dry fruits that open: Fruits of many members of the mustard family open like the one shown (1); poppy fruits (2) open by pores; common mullein fruits (3) and those of evening primrose (5) split; fruits of butter-and-eggs (4) open only at the top. Numbers 1, 2, and 5 are about natural size; 3 and 4,×2.

dry weather, or in a warm, dry place such as a schoolroom, you may discover some day that the seams have opened. Have you noticed how straight and smooth the edges of the break are? how the stalk of each pod bends down where it leaves the plant stem? how the tip of the pod is tilted up, with the seam on the side away from the stem? how the brown seeds with their silken parachutes loosen a few at a time, and float away on passing breezes?

Peas and beans are examples of fruits that naturally break open along two lines. If you have shelled peas for dinner, or helped to take lima beans out of their pods, you have taken advantage of that natural way of opening. The pods of common locust (page 16), a member of the plant family to which peas and beans belong, open similarly. If common locust (black locust) trees grow near your home, you probably know that locust pods may hang unopened on the trees long after they are ripe. You may have seen half-pods, some with seeds attached along one edge, skating over the snow and ice on windy days in winter. Do they lie perfectly flat, or are they usually twisted a bit? Which kind would wind be more likely to push? In most fencerows and along woodland borders, you should find other plants with fruits that split along two lines, like pea pods. Did you? Did you find the hog peanut described on page 23?

A great many dry fruits that open are divided into two or more parts or cells, each of which contains at least one seed. Often such fruits contain so many seeds you would find it difficult to count them. The evening primrose, illustrated on page 14, is an example. Many fruits of this type split from top to bottom, into pieces of much the same size and shape. Different kinds break into two, three, four, five, or even more parts. Witch-hazel (page 24) and touch-me-not (page 24) are fruits of this type that "explode"

When milkweed pods like this are open and empty, notice their satiny lining

The flat, brown pods of common or black locust are about 3 inches long

with force enough to throw their seeds away.

The garden poppy (page 14) illustrates another way of opening. Pores or chinks open below a ripe poppy capsule's flat top. When the plant is bumped by a passer-by or bent by strong winds, the seeds shake out like salt from a salt-shaker.

You are almost certain to find some members of the mustard family in New York State fencerows. The ripe fruits of most of them have a special way to open, shown on page 14. The two side pieces fall off, uncovering the seeds, which soon fall, leaving behind a thin, papery "partition." Not all of these fruits are the same size or shape. If you find some of the larger ones that have not opened, you may be able to see the lines along which the outer parts split. Often you can loosen these pieces at the lower end and peel them off as you would a banana skin.

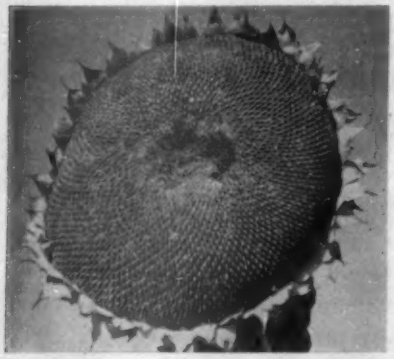
If you really become interested in these dry fruits that open, you will discover still more ways in which they do so. New plants and different seasons bring new discoveries. You will find that some fruits open as soon as they are ripe, and some are slower. Some soon shed all their seeds, but others may hold part or even all of them for weeks, even through the winter. Many fruits remain attached to the plant on which they grew, even after all their seeds are gone. Do you find any that fell from the plants before they opened? Some do.

Dry fruits that do not open

In your collection of fruits and seeds, you may have sunflower "seeds," grass "seeds," maple "seeds," wild carrot "seeds," and hickory nuts. All of these are dry fruits that do not open. They are seed-containers, with (usually) one seed inside. It is not always easy to *see* that this is true. But you can begin to learn about these fruits now, and be ready to learn more later if you are interested.

Let's look at a sunflower fruit first. Perhaps some of you took your specimens from a many-fruited sunflower head, like that on this page. Each fruit came from one flower. Many flowers were clustered together to make up each sunflower head. Sunflower fruits do not open easily. Haven't you seen chickadees at a feeding station work hard to do it? But usually you can break the outer part into two pieces and find the seed inside. Did you notice that it was fastened to the fruit in one place?

The fruits of asters, goldenrods, thistles, burdock, dandelion and many other plants are much like sunflower fruits. All of them come from separate, small flowers, clustered in heads. All of them have one seed inside. A fruiting teasel-head (page 26) also bears many small, dry fruits, each from a separate flower.



Sunflower "seeds" are a popular food for many kinds of birds

The fruits of barnyard grass are food for wildlife

How many can you shake out of one head?

Did you collect sugar maple fruits? They are much like the maple fruits illustrated on page 19. They ripen in the fall and drop from the trees near Ithaca in September. If you open the thick end of one of these fruits, you will usually find a brown-coated seed inside. Inside the seed-coats is the tiny tightly-rolled beginning of a sugar maple tree, together with food to help it start to grow. (True seeds usually have these three parts: (1) seed coats; (2) a tiny, new plant; and (3) a store of food.) The different kinds of maples have similar winged fruits, of different shapes and sizes. Ash fruits—we used to call them canoe paddles—are of the same type.

Queen Anne's lace

Queen Anne's lace, or wild carrot, (above) has an interesting way of forming "imitation birds' nests" when its flower clusters "go to seed." Did you collect some? If you did, carefully remove some of the small, bristly, ribbed fruits. Look at them with a magnifier if you can. Can you see that they are "split fruits" that easily break into two parts, each with one bristly side? Each part contains one seed. The barbed sweet cicely fruits described on page 22 are of the same type.

Many kinds of nuts that you find in New York State woods and fencerows have husks, or burs, or other outer coverings. But the nuts themselves are fruits that do not open when they are ripe. How well you know this if you have struggled to crack butternuts or black walnuts or even hickory nuts! The nutmeats you eat are the seeds. That is true also of beechnuts and hazelnuts. Acorns are fruits of this type, too. Many other plants have similar, but smaller, fruits called *nutlets*.

Plant growers use many kinds of these dry fruits that do not open just as they use seeds--they plant them when they wish to grow new plants. Important food crops grow from seedlike fruits of this type: corn, wheat, oats, rye, and rice—all of them members of the grass family. Some vegetables do, too: lettuce, parsley, and beets, for example; and many garden flowers, among them marigolds and zinnias. In nature, wild fruits of this type are planted like seeds.

People commonly call these types of fruits *seeds*, which, you

know, is quite all right, according to one definition of *seed*. You know now, however, that, scientifically speaking, some "seeds" are really fruits. You might call them *seedlike fruits*. We have mentioned a few kinds. There are many others, not always easy to recognize. You may learn to know more of them as you learn more about flowers and their fruits and seeds.

The winged fruits of white ash may remain on the trees through the winter. Other ashes have similar fruits

Something to Do

Make one big exhibit of the seeds and seedlike parts you took from your fleshy fruits (page 12) and the seeds and seedlike fruits that you found as you studied dry fruits. Can you plan a label that will include them all?

Now, pick out and label small groups of specimens that are alike in some easy-to-see way.

Some air-borne fruits: left to right, top, sycamore maple, red maple, American elm, silver maple; bottom, right, Norway maple

You may have a group that have silky "parachutes," as do milkweed seeds and dandelion fruits; or thin, stiff "wings," as do maple fruits and catalpa seeds; or barbs or hooks of some kind; or smooth surfaces; surfaces roughened by "bumps" or dents or lines that make interesting patterns; shiny surfaces; dull surfaces. Can you form groups of differently colored specimens: brown, black, yellow, two-colored, and so on? other groups?

Good ways to keep your collection (or groups from it) are: (1) glue the specimens to pieces of cardboard or fasten them with scotch tape; (2) put each specimen in a small cellophane envelope or, better, in a druggist's vial; (3) put specimens in boxes divided into compartments—you could use egg cartons fitted with cellophane or clear plastic covers.

Seeds Travel

SEEDS usually leave the plant on which they grew soon after they are ripe. Most seeds—or seeds and fruits together—have ways to travel that help to spread them to places where the seeds can grow. Sometimes the fruit remains on the plant, as milkweed pods do, and only the seeds travel. Often, as in dandelions, apples, and many other plants, the seeds journey off inside the fruits. In the next few pages you can read about the travel methods of a few plants of woods and fencerows. You can find more about seeds (and fruits) and their travels in your science books or in other books. Some are listed on pages 31 and 32.

Have You Examples?

Air-borne fruits and seeds

Some have "parachutes" of silky fluff. Some are gliders, like the stiff-winged maples—have you noticed how they spiral slowly to the ground? In *Air-borne,* the Leaflet for Fall 1955, you can read about many of these air-travelers. You can get this Leaflet if you do not have it. Write to *Cornell Rural School Leaflet,* Stone Hall, Cornell University, Ithaca, New York.

"Shaker" fruits or flower-heads

Evening primrose (page 14) is a "shaker" fruit; and teasel (page 26) is a "shaker" flower-head. Their seeds or fruits shake out when you or a strong wind or some other force bumps or tips them.

"Automatic Ejectors"

"Automatic ejectors" are fruits that "shoot" their seeds away, or fruits that "pop off" at a touch—if they are ripe enough. You can read about some of them on page 24. We hope that each of you can watch some of them work. Pansies and violets belong in this group.

Water-borne fruits or seeds

Did you collect any fruits or seeds from brooks or ponds? Fruits or seeds of land plants usually take to the water by accident. But once there, many float or sail long enough to be washed ashore where they may find good places to grow. Fruits or seeds blown to a curb in a street sometimes are carried away by a hard rain, and grow "downstream," where they were left by the running water. Water may carry seeds or fruits down steep slopes,

too. Perhaps you can think of other times when fruits or seeds may be water-borne.

Seeds and fruits that just fall

Often the seeds and fruits that just drop to the ground are heavy and rounded. Butternuts are a good example. When they fall, they may bounce a little and then roll along the ground, especially if the ground slopes. Apples and other firm fleshy fruits sometimes travel this way, too. Have you seen many of them move far? Many smaller, lighter fruits and seeds, some of them fleshy and some of them dry, seem to have no other way than this to travel. Animals often pick up and transport both the large, heavy fruits and the smaller ones.

"Tumbling" plants

Some weeds and some kinds of grasses (or parts of them) break off near the ground when their seeds or fruits are ripe. Away they may roll as wind pushes their curved, springy stems or branches. They scatter "seeds" as they go.

Skaters or sliders

Read again about the common locust (page 15). The pods of redbud travel in the same way.

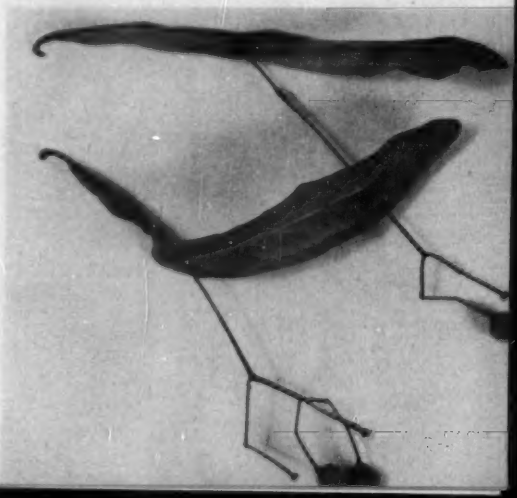
Transportation by animals

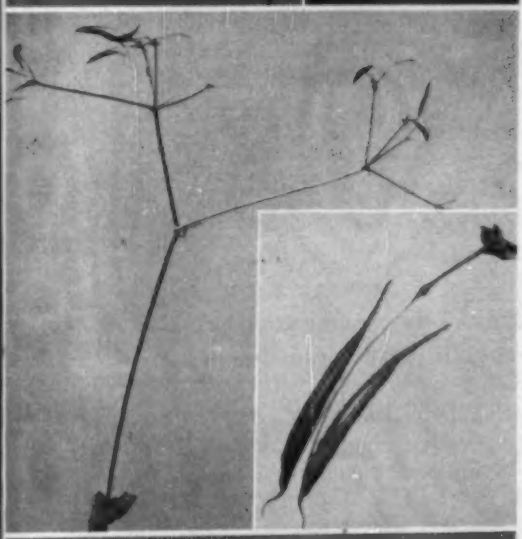
When seeds or fruits are transported by animals (humans included), one of the following is usually true: (1) either the fruit or the seeds inside or both serve as food or for some other use; (2) the fruits and seeds are carried accidentally, as you sometimes carry stick-tights and other "hitch-hikers." You can read more about this subject on pages 22, 23, 28, and 30.

Other ways to travel

You may have seeds or fruits that do not seem to fit into any of the groups we have listed. You may give their way of travel a name that you think describes it. But don't worry if you do not know their names or whether they are fruits or seeds.

The dry, nutlike fruits of basswood or linden dangle below a leafy "sail," and, when they fall, spiral earthward. Each fruit has 1 or 2 seeds





Some Hitch-Hikers

Almost every hiker in fields or along woods borders or fencerows knows well the small fruits of avens or *Geum* (top, left) with their slender, hooked tips. You rarely collect just one fruit—many were crowded together where each white or yellow flower once grew. Each flower had many pistils, that may have ripened into as many one-seeded fruits—some, enlarged, are shown.

The fruits of sweet cicely (center, left) are "split fruits" (page 18). When they are ripe, the two parts separate on slender threadlike supports. Just a touch will disconnect them, and the barbs with which they are well supplied hold them firmly to the clothes of humans or the fur of passing animals. The plants grow in woods and thickets.

Enchanter's nightshade (bottom, left) is a low woodland plant. Its small, bristly, teardrop-shaped fruits are well supplied with hooks. Cats, hunting along woodland borders, are just the right height to collect the clinging fruits, but larger animals, including humans, do not escape them. Usually, you remove them one by one—which may help greatly to spread the one or two seeds each fruit contains.

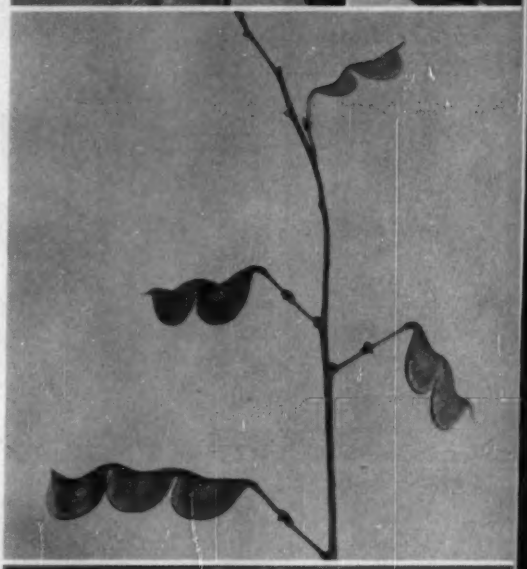
Various kinds of *Bidens*,

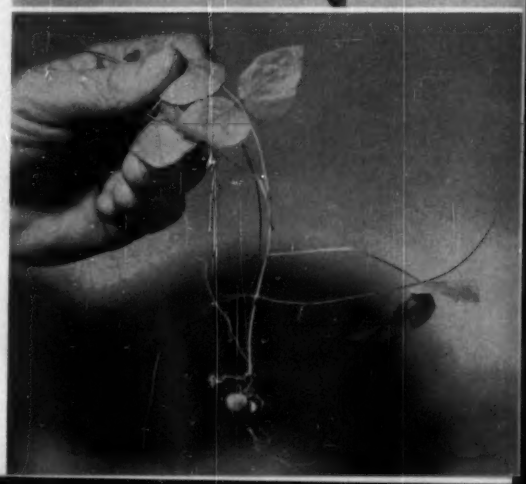
meaning 2-toothed, (at right) also travel by the hitch-hike method. Their barbed prongs, two in most kinds, but three or four in others, have earned them three common names—pitchforks, sticktights, and beggar-ticks. Their flowers give them another —bur-marigold. Each one-seeded stick-tight is the fruit of one flower of a many-flowered head.

The jointed pods of tick trefoil or tick clover are common souvenirs of fall walks in New York State woods and fencerows. Whole pods may attach themselves to your clothes, but you usually pick them off piece by piece. The pods break crosswise. Each part usually contains one seed. Did you ever remove them from a furry animal?

A Two-fruited Plant

The hog peanut (bottom, right) grows as a slender twining vine on low plants of woods and fencerows. On its upper branches it produces pale bluish or white flowers, followed by small, beanlike pods with beanlike seeds. It also bears scattered, inconspicuous flowers on short branches near the surface of the soil. These flowers "go underground," where they produce rounded, fleshy, usually 1-seeded pods, the "hog peanuts." In olden times, foraging pigs ate them.





"Ejector Fruits"

Witch-hazel (top, left) is interesting to fall hikers for two reasons. Its yellow flowers with their four straplike petals brighten autumn woods and thickets. Its woody fruits, from flowers of a year earlier, are excellent "automatic ejectors." They burst at the top, flinging out the smooth, black seeds inside. A boy once reported seeds that traveled the length of his schoolroom, almost 19 feet. Can you better that record?

Impatiens or Touch-me-not (center, left) is a low plant of shady, damp places. The illustration shows a ripe pod (at left) before we touched it with a finger-tip; and (at right) a moment later. The pod snaps open into five parts, which coil elastically, tossing out the seeds. The seeds have a pleasant, butternut-like flavor. The plant is also called *Snapweed* and *Jewelweed.*

Jumpseed (bottom, left) often grows in woodland borders and wooded thickets. When its small, one-seeded fruits are ripe, a light, upward pressure at the tip of the hooked, two-parted "trigger" makes the fruit snap off where it joins the slender stalk. Away it flies, too fast for eyes to follow it. It may travel as much as 6 feet.

Fruits, Seeds, and Man

MEN probably have used wild fruits and seeds as long as people have lived on the earth. Food was probably the first use, and fruits and seeds provide many important foods of today. How many can you list?

Seeds and fruits also furnish oils, some used as foods and some in the manufacture of paints, varnish, soap, and other products. Some "seeds," such as dill, nutmeg, and mustard, are valued for their flavor. Some have medicinal uses, and some are materials for beverages. But don't you think that man's most important use of seeds is to produce new plants?

Foods from Woods and Fencerows

The Indians who lived long ago in what is now New York State ate many wild fruits and seeds. Some grow in the woods and fencerows of today: wild strawberries, blueberries, raspberries, nuts, and many others. The Indians ate the fleshy fruits raw, or stewed them, or made them into jam. They dried some and kept them for winter use. They gathered acorns, particularly those of white oaks, and ate them boiled, roasted, or ground into flourlike meal. They harvested wild rice and the fruits of some other grasses. They got oil for cooking from hickory nuts, butternuts, walnuts, acorns, beechnuts, and others.

The early colonists learned from the Indians to use many of these wild fruits and seeds. They, too, ate them fresh, or cooked, or preserved in various ways for winter use.

Nowadays the wild fruits of woods and fencerows furnish little of our food. Some persons still make pies, or jam, or jelly from black elderberries (cover). Wild raspberries, wild strawberries, blackberries, and grapes are fairly abundant in some places. Fall trips to gather nuts are still possible in parts of the State. Other fruits, less well known and often less plentiful, may provide tasty nibbles for hikers and hunters, or could help to keep a lost person from starving. Some of you may be interested to learn more about edible wild fruits and ways to use them. Three helpful books are listed on pages 31 and 32. You will find information in *Wild Foods*, the Leaflet for March 1943. We are sorry it is no longer available,

The first blossoms of teasel or gypsy combs appear at the middle of the many-flowered head

but you may have it in your library.

You may need help to avoid poisonous fruits (fortunately there are not many). A good book is listed on page 32.

Other Uses, Past and Present

Indians and early American settlers used wild fruits and seeds in other ways no longer important in twentieth century New York State. Dyes were made from some. The husks of butternuts and walnuts, for example, produced tan or brown colors. Pokeberry juice (page 10) was used for ink and also to make a dark purple dye. Certain fruits and seeds were ingredients for homemade medicines. Some provided flavors and spices.

Most wild fruits and their seeds are left now for birds and other wildlife to eat. But in early times, cattle, horses, pigs, and other domestic animals often were turned loose to forage for themselves. Mast (nuts of all kinds) and other fruits and seeds were fall foods for these animals. Hog peanut (page 23) is said to have received its name because pigs frequently fed on the underground "peanuts."

There is beauty in woods and fencerows, too—in flowers and fruits for visitors who come close; in brilliant autumn colors for those at a distance. Each other season has its special attractions. Probably people of all times have enjoyed the beauty of wild places. Now, dogwoods and viburnums of several kinds, bittersweet, mountain ash, and other plants of woods and fencerows often are used as ornamental plants near homes or in parks.

Dried fruiting heads of teasel, dry milkweed pods, and the fruit-bearing parts of many plants help to make attractive winter bouquets. Once a Christmas tree was trimmed with nothing but ornaments made from wild fruits and the cones of

"evergreens." Even bracelets, necklaces, and other "jewelry" have been made from wild fruits and seeds. Imagine a bracelet made from the hard shells of black walnuts, sliced and polished!

New Plants

Did you ever stop to think that all the fruits we grow in orchards, vineyards, gardens, and fields were once wild plants? Some have been cultivated so long that no one is sure where the wild plants grew naturally nor what they were like. Different plants grow in different parts of the world. So the plants that people learned to use and finally to raise in Europe, for example, were not like those used and sometimes cultivated by the early Americans.

Corn, for example, was cultivated in the Americas long before the first white men landed in North America. The Indians had known for perhaps hundreds of years how to raise this food from seed. They had learned to save seed from year to year, and to carry a stock of their best with them when they moved to new places. You may remember that Captain John Smith in Virginia learned about corn from the Indians. The Jamestown colonists grew corn when they found that seeds they had brought with them did not grow well in the new climate. In New England, too, Indian corn soon became an important food of the colonists.

Perhaps you can discover other foods first cultivated only in some one part of the world.

Some of the plants men cultivate now are not much different from their wild relatives, although they may have been improved by care and cultivation. Seeds developed by various methods of plantbreeding have produced new and better kinds of many useful plants. Hybrid corn is a famous example.

Butter-and-eggs may have flowers and fruit at the same time. Ripe seeds are black and wafer-shaped

Men Transport Fruits and Seeds

Seeds men have carried from place to place all over the world have added new plants in almost every region. Pioneers have usually carried with them seeds of familiar plants, to plant in their new homes, as food for themselves and their domestic animals, or for other uses. Often with the seeds they valued, they accidentally carried seeds of weeds and other undesired plants. Scientists have brought new plants to many regions where they have proved valuable.

Some of the crop seeds and many of the weed seeds grew well in their new locations. In time some became as much at home in woods and fencerows of New York State as native plants. Perhaps some of the seeds and fruits in your collection are "immigrants" from far countries. Butter-and-eggs (page 27), teasel (page 26), and wild carrot (page 18) are examples. All three came to America from Europe.

Fruits, Seeds, and Animals Other Than Man

All through the year fruits and seeds from woods and fencerows provide food for New York birds and mammals. Fruits ripen from late spring to late fall. Many, seeds and all, remain on the plants through the winter and well into the spring season. You may find it interesting to see how many kinds of fruits and seeds you can find outdoors in January. How many kinds are high enough to reach above deep snow?

These long-lasting fruits that ripened earlier in the year are a large part of the winter diet of game birds, such as pheasants, quail, and ruffed grouse. Juncos and other members of the sparrow group live largely on weed seeds and seedlike fruits. Crows eat quantities of fruits and seeds, even poison-ivy fruits. Most woodpeckers include some fruits and seeds in their winter menu. Through late spring, summer, and fall new crops ripen, and the larger summer population of birds feeds on them. For some of these fruits—cherries, for example—humans and the birds compete. But birds like many kinds of wild fruits and seeds that do not tempt us in the least.

White-tailed deer eat some mast (nuts, you remember) and some other fruits. Meadow mice consume many seeds and seedlike fruits. Opossums like fleshy fruits. Fortunately for these animals, too, many such foods are

available during the winter. Have you noticed tracks under old apple trees whose fruits nobody bothered to pick?

One way to learn what wild birds and mammals eat is to watch and keep records. You may see a squirrel or a chipmunk gathering beechnuts; a catbird swallowing whole grapes from your grapevines; a robin stripping flowering dogwood of its bright red fruits; or a pheasant making a winter meal of Japanese barberries. Tracks in the snow may show where sparrows feasted on pigweed fruits. On stumps or stones you may find the remains of nuts eaten by squirrels or other gnawing mammals. Such animals gnaw through the shells of nuts in different ways. Their toothmarks often identify them. How many signs of animal meals can you find?

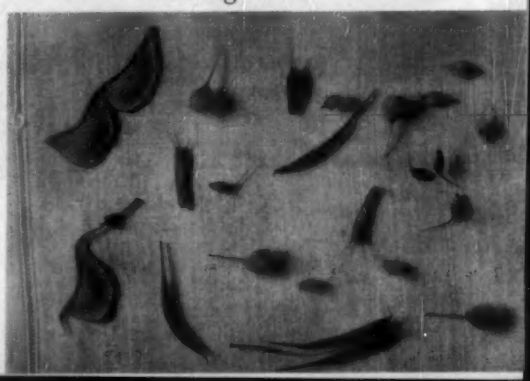
It might be fun to keep a record of *"Eaters and What They Eat."* Your "Eater" record might include pictures, and your food record a collection of things you have seen each kind of animal eat. You may find that some animals change their diet with the seasons, partly because different foods are available. Most animals are likely to feed on whatever is plentiful and easy to get. They seem to prefer certain foods as you (and most persons) do, and eat first what they like best. Do they seem to leave some foods until little else is available?

Wildlife experts use food records in their work. It is important for them to know the diet of the animals they work with. Undigested foods they find in the crops of dead birds and in the stomachs of dead mammals add more information. Clues are also found in the scats or droppings of animals.

Insects

Watch for insects in the fruits and seeds you collect. Many kinds of these animals live and feed in fruits and seeds. Some live in fruit clusters, such as sumac bobs. Many live inside fruits. Some even live inside seeds. One seed-eater you are likely to find is a small beetle that spends the winter inside a common mullein fruit (page 14). A white moth-caterpillar lives in burdock burs, in a burrow made through several fruits, fastened together with silk.

Most of the hitch-hikers on the handkerchief grew on plants about knee-high



Birds and Mammals Spread Seeds

A bird feeding on fleshy fruits may discard the seeds or stones as we discard cherry pits. Or, it may swallow fruit and "seed" together, and later eject the "seeds" from its mouth. Or, the seeds or pits may pass through the bird's digestive system and leave its body undigested, as parts of the droppings. Mammals, too, may discard seeds or stones. Or, these plant parts may pass through their bodies undigested.

Usually these undigested "seeds" are unharmed, so far as ability to grow is concerned. Some kinds of seeds benefit from this treatment and grow even more readily.

Probably many of the sumacs along fencerows, or choke cherries, or blackberry bushes, or wild grapevines, or poison-ivy plants have grown where some bird or some mammal dropped the seeds from a fruity meal.

Nuts and other fruits and seeds hidden by bluejays or squirrels or other animals that store such foods often escape being eaten and grow into new plants. Nut trees may be "planted" in this way.

Birds and mammals probably spread many seeds accidentally. Uneaten food may be dropped. Small seeds or fruits may cling to the bills, feathers, or feet of birds, or be carried about with nesting materials. Furry mammals are good carriers of hitchhiker fruits and seeds, as you know if you and a long-haired dog visit woods and fencerows in fall. Haven't you seen the fur of cats matted with burs and sticktights of various kinds?

Of course, many fruits and seeds *are* digested by birds and mammals that eat them. Insects destroy some. No new plants will grow from them. Usually plants produce more than enough seeds to keep their kind on earth. One pigweed, for example, may produce 100,000 or more of its small, one-seeded fruits. Birds and other animals may destroy some, but enough are left to grow when growing time comes.

Do You Feed Birds and Mammals?

You can learn much about birds and mammals and their food habits by feeding them in the winter. More winter birds may come to your feeding stations if you give them some wild seeds and fruits. Try cracked nuts and even such small fruits as those of barnyard grass (page 17). You may need to dry some

of these foods near a radiator to make sure they will not spoil. If you have room in your home freezer, you may collect wild grapes, elderberries, and other fleshy fruits, and freeze them, *without sugar*. At Cornell University, injured birds are often helped to live by feeding them thawed wild fruits. The Spring 1953 Leaflet, *Inviting Bird Neighbors*, has many suggestions to help you attract birds to your neighborhood.

You may have other visitors than birds. We have had both raccoons and opossums as nighttime guests. We saw the raccoon, and the opossum left its odd little tracks in the snow on the back steps. Both helped themselves to the bird food, especially peanut butter.

You can feed birds and mammals in wood and fencerow feeding stations, too. Look for trees or other plants that keep snow away from small areas on the ground. These places may be good spots to put feed for creatures that usually feed on the ground. You could serve the animals bigger helpings of their favorite wild foods by planting more of the kinds of plants that bear them. Maybe you could begin a 4-H Club or a scouting project of this kind. More plants usually provide more shelter, and better roosting places for birds. Animals need shelter and protection, too.

Useful Books

Seeds and fruits

A Book of Wayside Fruits. By Margaret McKenny and Edith F. Johnston. The Macmillan Company, New York City. 1945. 80 pages. Attractive colored illustrations and interesting information. Grade 5 and up.

Flowers, Fruits, Seeds. By Bertha M. Parker. Row, Peterson and Company, Evanston, Illinois. 1941. 36 pages. A helpful booklet, with many colored illustrations. Grade 5 and up.

How to Know Wild Fruits. By Maude G. Peterson. The Macmillan Company, New York City. 1923. 340 pages. Interesting and useful. For older readers.

Seeds and Seed Travels. By Bertha M. Parker. Row, Peterson and Company, Evanston, Illinois. 1947, 1941. 36 pages. The good colored pictures are especially helpful. Grades 4 to 6.

The Wonders of Seeds. By Alfred Stefferud. Harcourt, Brace and Company, New York City. 1956.

119 pages. How seeds and fruits are formed, how they grow, how they are used. Grade 5 and up.

Plants in general

Bits That Grow Big. By Irma E. Webber. William R. Scott, New York City. 1949. 64 pages. How plants grow. Grade 3 and up.

A Garden Indoors. By Bertha M. Parker. Row, Peterson and Company, Evanston, Illinois. 1944. 36 pages. Useful if you wish to grow plants. Grades 5 to 7.

Indian Harvest. By Jannette May Lucas. J. B. Lippincott Company, Philadelphia, Pennsylvania. 1945. 118 pages. About wild food plants of America. Grade 6 and up.

Play with Plants. By Millicent E. Selsam. William Morrow and Company, New York City. 1949. 63 pages. Many things to do to learn how plants grow. Grades 3 to 7.

For teachers and older readers

American Wildlife and Plants. By A. C. Martin, H. S. Zim, and A. L. Nelson. McGraw-Hill Book Company, New York City. 1951. 500 pages.

Fieldbook of Natural History. By E. Laurence Palmer. McGraw-Hill Book Company, New York City. 1949. 664 pages.

Handbook of Nature Study. By Anna Botsford Comstock. Comstock Publishing Company, Ithaca, New York. 1939. 937 pages.

Edible Wild Plants. By Oliver P. Medsger. The Macmillan Company, New York City. 1939. 323 pages.

Edible Wild Plants of Eastern North America. By Merritt L. Fernald and Alfred C. Kinsey. Idlewild Press, Cornwall-on-Hudson, New York. 1943. 452 pages.

Plants: A Guide to Hobbies. By Herbert S. Zim. Harcourt, Brace and Company, New York City. 1947. 398 pages. Helpful chapters on plant collections and on seed plants are included.

Poisonous Plants of the United States. By Walter C. Muenscher. The Macmillan Company, New York City. Revised edition, 1951. 277 pages.

Weeds. By Walter C. Muenscher. The Macmillan Company, New York City. 1935. 579 pages.

Remember these

Your *science textbooks*
Encyclopedias
Past *Cornell Rural School Leaflets* you may have

Cooperative Extension Service, New York State College of Agriculture at Cornell University and the U.S. Department of Agriculture cooperating. In furtherance of Acts of Congress May 8, June 30, 1914. M. C. Bond, Director of Extension, Ithaca, New York.